

Amendments to the claims are indicated in the attached "Marked Up Version of Amendments" (page ii)

REMARKS

Claims 1-6, 11-15, 18, 22-27, and 29-49 are presently pending. Claims 34-43 have been withdrawn from consideration due to the Restriction Requirement.

Rejection under 35 U.S.C. § 102

The Examiner again rejected Claims 1-2, 5, 11-13, 18, and 24-26 under 35 U.S.C. § 102(b) as being anticipated by Nilsen *et al.* (U.S. Patent No. 5,657,162). The Examiner looks to the embodiment of Figure 5 of Nilsen *et al.* to show two layers of retroreflective prisms.

Independent Claims 1 and 25 have been respectively amended to emphasize that light incident on the optical or reflective coating is retroreflected without passing through the substantially rigid material or sheeting. Support for these amendments is found at least on page 14, lines 11-13 and Figure 14 of the originally filed patent application. No new matter has been added.

An advantage of the open-faced sheeting "is that it can be formed from materials which can have superior properties in areas, such as heat resistance, non-flammability, dimensional stability, environmental durability, chemical resistance, etc., without the requirement that the material be transparent as in the traditional construction," as disclosed at page 9, lines 19-23 of the present application. As further set forth at page 9, lines 23-25, another advantage to this construction is that "when the open-faced structure is formed of environmentally fragile polymers, the metal face coating can serve to protect them from destruction by ultraviolet light, moisture, oxygen, etc."

The prisms disclosed in Nilsen *et al.* retroreflect light that passes through the material that forms the cube-corner prisms and thus the prisms must be formed from a material that is substantially transparent to allow the light rays to pass therethrough.

It is therefore believed that the rejection has been overcome with respect to these claims.

The Examiner again rejected Claims 44, 46, and 48 under 35 U.S.C. § 102 as being anticipated by Fellows *et al.* (U.S. Patent No. 6,050,691).

Independent Claim 44 has been amended to recite that the coating retroreflects "light incident thereon such that light does not pass through the chips." Support for this amendment is found at least on page 14, lines 11-24 and Figure 14 of the originally filed patent application. No new matter has been added.

In contrast, the prisms disclosed in Fellows *et al.* are traditional cube-corner prisms and are not open-faced cube-corner surfaces and must be formed from substantially transparent material such that incoming light rays can pass through cube-corner elements and be reflected by three orthogonal surfaces.

Accordingly, the rejection is believed to be overcome with respect to these claims.

#### Rejection under 35 U.S.C. §§ 102/103

The Examiner again rejected Claims 3 and 4 under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Nilsen *et al.*

Claims 3 and 4 depend directly and indirectly, respectively, from independent Claim 1 and thus include the patentable distinction over Nilsen *et al.* as set forth above.

Accordingly, this rejection is respectfully traversed.

#### Rejections under 35 U.S.C. § 103

The Examiner rejected Claims 1-5, 11, 12, 14, 15, 18, 22-27, 30-33, 44, 45, and 47 under 35 U.S.C. § 103(a) as being unpatentable over Stump *et al.* (U.S. Patent No. 5,835,271) in view of Nilsen *et al.*

Each of the independent claims, namely Claims 1, 25, 32, and 44, recites open-faced prisms or surfaces that retroreflect light incident on the optical, reflective, or metal coating such that retroreflected light does not pass through the structure. It is respectfully submitted that this limitation is not taught or suggested by Stump *et al.* and Nilsen *et al.*, taken individually or in

combination. The multi-sided retroreflector 20 of Stump *et al.* includes a first layer of transparent microspheres 22 and a second layer of transparent microspheres 24 (see Figure 2). A reflecting layer 40 is provided on the rear surface of the microspheres 22, 24. As with traditional cube-corner prisms, the light rays must pass through the material that forms the microspheres. Thus, Stump *et al.* fail to teach or suggest open-faced cube-corners.

Accordingly, the rejection is respectfully traversed in view of the amendments to the independents claims.

The Examiner rejected Claims 6 and 49 under 35 U.S.C. § 103(a) as being unpatentable over Stump *et al.* in view of Nilsen *et al.* as applied to Claims 1-5, 11, 12, 14, 15, 18, 22-27, 30-33, 44, 45, and 47 above, and further in view of Coderre (U.S. Patent No. 5,272,562). Claims 6 and 49 each depend directly from independent Claim 1 and thus include the amended limitation of "light incident on the optical coating being retroreflected without passing through the substantially rigid material."

Coderre is directed to a retroreflective article having traditional cube-corner elements wherein light passes through the elements and is retroreflected at the cube-corner surfaces. It is respectfully submitted that Coderre does not teach or suggest open-faced cube-corner surfaces that retroreflect light that does not pass through the substantially rigid material. It is respectfully submitted that the references cited by the Examiner taken individually, or in combination, fail to teach or suggest all the limitations of amended independent Claim 1.

The Examiner rejected Claims 13 and 46 under 35 U.S.C. § 103(a) as being unpatentable over Stump *et al.* in view of Nilsen *et al.* as applied to Claims 1-5, 11, 12, 14, 15, 18, 22-27, 30-33, 44, 45, and 47, and further in view of Heenan (U.S. Patent No. 4,208,090).

Claim 13 depends directly from Claim 1, which recites first and second open-faced cube-corner surfaces that retroreflect light without the light passing through the substantially rigid material, and Claim 46 depends directly from independent Claim 44, which recites open-faced cube-corner surfaces having a coating thereon configured to retroreflect light incident on the coating such that light does not pass through the chips.

As shown, for example, in Figure 7 of Heenan, the reflector elements 220 are analogous to traditional air-backed retroreflective prism elements since light rays must pass through the material that forms the reflector elements 220. It is respectfully submitted that Heenan fails to teach or suggest open-faced cube-corner surfaces that retroreflect light without it passing through the material that forms the retroreflective surfaces. Thus, the cited references, taken alone or in combination, do not teach all the limitations of Claims 13 and 46.

Accordingly, the rejection is respectfully traversed.

#### CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner believes that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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MARKED UP VERSION OF AMENDMENTSSpecification Amendment under 37 C.F.R. § 1.121(b)(1)(iii)

Replace the paragraph at page 8, line 15 through page 9, line 9 with the below paragraph marked up by way of bracketing and underlining to show the change relative to the previous version of the paragraph.

The cube-corner surfaces 18 are covered with an optical coating 20, such as a metal layer that includes aluminum, silver or other suitable specular metal, as shown in Figure 6. In one embodiment, a low index transparent perfluorinated polymer, which has an index of refraction of about 1.1, can be used as an optical coating to coat the surfaces 18. The open-faced prisms can be filled with a fill coat 32, such as a colored or substantially clear/transparent long weathering polymer, as shown in Figure 7. The fill coat 32 can be permanently attached to the specular metal. The polymer can be flexible and/or elastomeric. It is not required that the fill coat 32 provide any strength to the sheeting 14 as such is provided by the rigid material forming the prism islands 22 to maintain a dihedral angle of ninety degrees of the open-faced prisms. This allows for the use of materials that are not structurally strong enough for conventional cube-corner prisms, but have other physical properties that are advantageous for retroreflective sheeting, such as increased ultraviolet light stability, etc. Examples of fill materials include simple acrylic or acrylic-fluorocarbon polymers. It is preferable that fill coat 32 be substantially resistant to UV degradation. In one embodiment, the fill coat 32 comprises a material having an application viscosity of less than or equal to about 1,000 [centipoise] centipoises. Such materials can also have a low glass transition temperature, such as fluorocarbon, fluorinated acrylic, or fluorinated urethane. An example of a suitable low glass transition temperature range is between about -20 and 80 degrees Celsius (-4 and 176 degrees Fahrenheit). Preferably, the glass transition temperature is less than about 15 degrees Celsius (59 degrees Fahrenheit). It is noted that the fill coat 32 increases the entrance angle at which light rays R enter and therefore can be retroreflected by cube-corner surfaces 18. Fill coat 32 can be designed to be wavy (non-planar) to improve angular retroreflective performance.

Claim Amendments under 37 C.F.R. § 1.121(c)(1)(ii)

1. (Twice Amended) Retroreflective sheeting, comprising:
  - a) a plurality of first open-faced cube-corner surfaces formed from a substantially rigid material to keep the first cube-corner surfaces from flexing, the first cube-corner surfaces being disposed on a first side of a carrier substrate;
  - b) a plurality of second open-faced cube-corner surfaces formed from the substantially rigid material to keep the second cube-corner surfaces from flexing, the second cube-corner surfaces being disposed on a second side of the carrier substrate; and
  - c) an optical coating disposed on at least some of the first and second cube-corner surfaces, light incident on the optical coating being retroreflected without passing through the substantially rigid material.
25. (Twice Amended) Retroreflective sheeting, comprising:
  - a) a first plurality of three-sided indentations which form first open-faced cube-corners;
  - b) a second plurality of [three sided] three-sided indentations which form second open-faced cube-corners opposing the first open-faced cube-corners; and
  - c) a reflective coating disposed on at least a portion of the first and second three-sided indentations for retroreflecting light that does not pass through the sheeting.
32. (Twice Amended) Retroreflective chip, comprising:
  - a) a structure having a plurality of open-faced cube-corner surfaces formed therein, the structure having a length less than about 457 micrometers; and
  - b) a metal layer formed on the surfaces that retroreflects incident light thereon such that retroreflected light does not pass through the structure.
44. (Amended) Retroreflective chips comprising open-faced cube-corner surfaces having an optical coating thereon, the coating retroreflecting light incident thereon such that light does not pass through the chips.